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Listing of Claims

The following listing of claims will replace all prior versions, and listings, of claims in the

subject application:

1. (currently amended) A method of reducing a size of a binary image, comprising

the steps of:

reducing the size of the binary image in a sub-scanning direction by using a

conditional OR process; and

limiting a size-change point determined by a reduction rate to an odd-number line or

an even-number line,

wherein the conditional OR process is carried out only on one of the odd-number line

or the even-number line,

when the one of the odd-number line or the even-number line to process corresponds

to a size-change point, after the line has been processed, a thin-out flag is turned on for the

other line, and

when the other line corresponds to a size-change point or the thin-out flag is turned on

therefor, image output is not carried out.

2. (original) The method of reducing the size of a binary image as claimed in claim 1,

further comprising the step of thinning out an image of either a line immediately preceding or

a line immediately following the size-change point.

3. (original) A method of reducing a size of a binary image, wherein a reduction

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process in a sub-scanning direction comprises the steps of:

thinning out an image of an odd-numbered line and producing a reduced image using

a conditional OR process for an even-number line immediately following the odd-number

line when a size-change point determined by a reduction rate is the odd-number line,

producing a reduced image using a conditional OR process for an even-number line

and thinning out an image of an odd-number line immediately following the even-number

line when the size-change point determined by the reduction rate is the even-number line.

4. (original) The method of reducing the size of a binary image as claimed in claim 3,

wherein the method produces but does not output the reduced image and instead outputs a

non-reduced image for the even-number line.

5. (original) The method of reducing the size of a binary image as claimed in claim 3,

wherein the method produces and outputs the reduced image when the size-change point

determined by the reduction rate is the even-number line.

6. (original) The method of reducing the size of a binary image as claimed in claim 3,

wherein the method produces but does not output a reduced image and instead outputs a non-

reduced image for the even-number line when the immediately preceding odd-number line is

not thinned out.

7. (original) The method of reducing the size of a binary image as claimed in claim 3,

wherein the method produces and outputs a reduced image for the even-number line when the

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immediately preceding odd-number line is thinned out.

8. (original) A method of reducing a size of a binary image, wherein a reduction

process in a sub-scanning direction comprises the steps of:

thinning out an image of an even-numbered line and producing a reduced image using

a conditional OR process for an odd-number line immediately following the even-number

line when a size-change point determined by a reduction rate is the even-number line,

producing a reduced image using a conditional OR process for an odd-number line

and thinning out an image of an even-number line immediately following the odd-number

line when the size-change point determined by the reduction rate is the odd-number line.

9. (original) The method of reducing the size of a binary image as claimed in claim 8,

wherein the method produces but does not output a reduced image and instead outputs a non-

reduced image for the odd-number line.

10. (original) The method of reducing the size of a binary image as claimed in claim

8, wherein the method produces and outputs a reduced image for the odd-number line.

11. (original) The method of reducing the size of a binary image as claimed in claim

8, wherein the method produces but does not output a reduced image and instead outputs a

non-reduced image for the odd-number line when the immediately preceding even-number

line is not thinned out.

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12. (original) The method of reducing the size of a binary image as claimed in claim 8, wherein the method produces and outputs a reduced image for the odd-numbered line when the immediately preceding even-number line is thinned out.

13. (original) The method of reducing the size of a binary image as claimed in claim 1, wherein the size of the binary image in a scanning direction is reduced before the size of the binary image in the sub-scanning direction is reduced.

14. (currently amended) ~~The~~ A method of reducing the size of a binary image ~~as claimed in claim 1~~, comprising the steps of:

reducing the size of the binary image in a sub-scanning direction by using a conditional OR process; and

limiting a size-change point determined by a reduction rate to an odd-number line or an even-number line,

wherein, when a target reduction rate is 50 percent or below, a binary image of the target reduction rate is produced by reducing the size of the binary image in the sub-scanning direction to twice the target reduction rate using a simple thinning-out method and further reducing the reduced binary image to the target reduction rate using the conditional OR process.

15. (currently amended) An image processing device for processing a binary image comprising:

an image size reduction component that reduces the size of the binary image in a sub-

scanning direction by using a conditional OR process; and

a limiting component that limits a size-change point determined by a reduction rate to

one of an odd-number line or an even-number line.

16. (original) The image processing device as claimed in claim 15, further

comprising a component that thins out an image of either a line immediately preceding or a

line immediately following the size-change point.

17. (original) An image processing device for processing a binary image comprising:

a first component that thins out an image of an odd-numbered line and produces a

reduced image using a conditional OR process for an even-number line immediately

following the odd-number line when a size-change point determined by a reduction rate is the

odd-number line; and

a second component that produces a reduced image using a conditional OR process

for an even-number line and thins out an image of an odd-number line immediately following

the even-number line when the size-change point determined by the reduction rate is the

even-number line.

18. (original) The image processing device for processing a binary image as claimed

in claim 17, wherein the device produces but does not output a reduced image and instead

outputs a non-reduced image for the even-number line.

19. (original) The image processing device for processing a binary image as claimed

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in claim 17, wherein the device produces and outputs the reduced image for the even-number

line.

20. (original) The image processing device for processing a binary image as claimed

in claim 17, wherein the device produces but does not output a reduced image and instead

outputs a non-reduced image for the even-number line when the immediately preceding odd-

number line is not thinned out.

21. (original) The image processing device for processing a binary image as claimed

in claim 17, wherein the device produces and outputs a reduced image for the even-number

line when the immediately preceding odd-number line is thinned out.

22. (original) An image processing device for processing a binary image method

comprising:

a first component that thins out an image of an even-numbered line and produces a

reduced image using a conditional OR process for an odd-number line immediately following

the even-number line when a size-change point determined by a reduction rate is the even-

number line; and

a second component that produces a reduced image using a conditional OR process

for an odd-number line and thins out an image of an even-number line immediately following

the odd-number line when the size-change point determined by the reduction rate is the odd-

number line.

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23. (original) The image processing device for processing a binary image as claimed in claim 22, wherein the device produces but does not output a reduced image and instead outputs a non-reduced image for the odd-number line.

24. (original) The image processing device for processing a binary image as claimed in claim 22, wherein the device produces and outputs a reduced image for the odd-number line.

25. (original) The image processing device for processing a binary image as claimed in claim 22, wherein the device produces but does not output a reduced image and instead outputs a non-reduced image for the odd-number line when the immediately preceding even-number line is not thinned out.

26. (original) The image processing device for processing a binary image as claimed in claim 22, wherein the device produces and outputs a reduced image for the odd-number line when the immediately preceding even-number line is thinned out.

27. (original) The image processing device as claimed in claim 15, wherein the image size reduction component reduces the size of the binary image in a scanning direction before reducing the size of the binary image in the sub-scanning direction.

28. (currently amended) ~~The~~ An image processing device ~~as claimed in claim 15~~ for processing a binary image comprising:

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an image size reduction component that reduces the size of the binary image in a sub-scanning direction by using a conditional OR process; and

a limiting component that limits a size-change point determined by a reduction rate to an odd-number line or an even-number line,

wherein the image size reduction component, when a target reduction rate is 50 percent or below, produces a binary image of the target reduction by reducing the size of the binary image in the sub-scanning direction using a simple thinning-out method to twice the target reduction rate and further reduces the reduced binary image to the target reduction rate using the conditional OR process.

29. (currently amended) The An image processing device as claimed in claim 15 for processing a binary image comprising:

an image size reduction component that reduces the size of the binary image in a sub-scanning direction by using a conditional OR process; and

a limiting component that limits a size-change point determined by a reduction rate to an odd-number line or an even-number line,

wherein the image size reduction component, when a current process line is other than the size-change point, reads and then discards data of an immediately preceding line memory component, and rewrites data read from a memory component in which a preceding reduction result is stored to the preceding line memory component.

30. (original) An image processing device for processing a binary image comprising:

a conditional OR processing component that reduces a size of an image in a sub-

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scanning direction using a conditional OR process;

a reduction result line memory component that stores data output from the conditional

OR processing component;

an immediately preceding line memory component that stores binary image data of an

immediately preceding line; and

a control component that inputs binary image data of a current processing line,

preceding reduction result data read from the reduction result line memory component, and

binary image data of an immediately preceding line read from the immediately preceding line

memory component to the conditional OR processing component so as to perform conditional

OR processing of the current processing line, and limits a size-change point determined by a

reduction rate and employing the data output from the conditional OR processing component

to either an odd-number line or an even-number line.

31. (original) The image processing device as claimed in claim 30, wherein the

control component further thins out an image of either a line immediately preceding or a line

immediately following the odd-number line or the even-number line corresponding to the

size-change point.

32. (original) An image processing device for processing a binary image comprising:

a conditional OR processing component that reduces a size of an image in a sub-

scanning direction using a conditional OR process;

a reduction result line memory component that stores data output from the conditional

OR processing component;

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an immediately preceding line memory component that stores binary image data of an

immediately preceding line; and

a control component that inputs binary image data of a current processing line,

preceding reduction result data read from the reduction result line memory component, and

binary image data of an immediately preceding line read from the immediately preceding line

memory component to the conditional OR processing component so as to perform conditional

OR processing of the current processing line, wherein:

when a size-change point determined by a reduction rate is an odd-number line, the

control component thins out an image of the odd-number line and reduction data is produced

by the conditional OR processing component for an even-number line immediately

succeeding the odd-number line; and

when the size-change point determined by the reduction rate is an even-number line,

reduction data is produced by conditional OR processing component for the even-number line

and thins out an image of an odd-number line immediately succeeding the even-number line.

33. (original) The image processing device for processing a binary image as claimed

in claim 32, wherein the device does not output the produced reduction data and instead

outputs non-reduction data for the even-number line.

34. (original) The image processing device for processing a binary image as claimed

in claim 32, wherein the device produces and outputs the reduced image for the even-number

line.

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35. (original) The image processing device for processing a binary image as claimed in claim 32, wherein the device produces but does not output a reduced image and instead outputs a non-reduced image for the even-number line when the immediately preceding odd-number line is not thinned out.

36. (original) The image processing device for processing a binary image as claimed in claim 32, wherein the method produces and outputs a reduced image for the even-number line when the immediately preceding odd-number line is thinned out.

37. (original) An image processing device for processing a binary image comprising:

a conditional OR processing component that reduces a size of an image in a sub-scanning direction using a conditional OR process;

a reduction result line memory component that stores data output from the conditional OR processing component;

an immediately preceding line memory component that stores binary image data of an immediately preceding line; and

a control component that inputs binary image data of a current processing line, preceding reduction result data read from the reduction result line memory component, and binary image data of an immediately preceding line read from the immediately preceding line memory component to the conditional OR processing component so as to perform conditional OR processing of the current processing line, wherein:

when a size-change point determined by a reduction rate is an even-number line, the control component thins out an image of the even-number line and produces reduction data by

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the conditional OR processing component for an odd-number line immediately succeeding

the even-number line; and

when the size-change point determined by the reduction rate is an odd-number line,

the control component produces reduction data output by the conditional OR processing

component for the odd-number line and thins out an image of an even-number line

immediately succeeding the odd-number line.

38. (original) The image processing device for processing a binary image as claimed

in claim 37, wherein the device produces but does not output the reduced image and instead

outputs a non-reduced image for the odd-number line.

39. (original) The image processing device for processing a binary image as claimed

in claim 37, wherein the method produces and outputs a reduced image for the odd-number

line.

40. (original) The image processing device for processing a binary image as claimed

in claim 37, wherein the method produces but does not output a reduced image and instead

outputs a non-reduced image for the odd-number line when the immediately preceding even-

number line is not thinned out.

41. (original) The image processing device for processing a binary image as claimed

in claim 37, wherein the method produces and outputs a reduced image for the odd-number

line when the immediately preceding even-number line is thinned out.

42. (original) The image processing device as claimed in claim 30, wherein the

control component reduces the size of the binary image in a scanning direction before

reducing the size of the binary image in the sub-scanning direction.

43. (original) The image processing device as claimed in claim 30, wherein the

control component, when a target reduction rate is 50 percent or below, produces a binary

image of the target reduction rate by reducing the size of the binary image in the sub-scanning

direction to twice the target reduction rate using a simple thinning-out method and further

reducing the reduced binary image to the target reduction rate using the conditional OR

process.

44. (original) A method of controlling an image processing device for processing a

binary image, the method comprising the steps of:

reducing a size of an image in a sub-scanning direction using a conditional OR

process conducted by a conditional OR processing component;

storing data output from the conditional OR processing component in a reduction

result line memory component;

storing binary image data of an immediately preceding line in an immediately

preceding line memory component;

inputting binary image data of a current processing line, preceding reduction result

data read from the reduction result line memory component, and binary image data of an

immediately preceding line read from the immediately preceding line memory component to

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the conditional OR processing component so as to perform conditional OR processing of the

current processing line; and

limiting a size-change point determined by a reduction rate and employing the data

output from the conditional OR processing component to either an odd-number line or an

even-number line.

45. (original) The method of controlling an image processing device for processing a

binary image as claimed in claim 44, further comprising the step of

thinning out an image of either a line immediately preceding or a line immediately

following the odd-number line or the even-number line corresponding to the size-change

point.

46. (original) A method of controlling an image processing device for processing a

binary image, the method comprising the steps of:

reducing a size of an image in a sub-scanning direction using a conditional OR

process conducted by a conditional OR processing component;

storing data output from the conditional OR processing component in a reduction

result line memory component;

storing binary image data of an immediately preceding line in an immediately

preceding line memory component;

inputting binary image data of a current processing line, preceding reduction result

data read from the reduction result line memory component, and binary image data of an

immediately preceding line read from the immediately preceding line memory component to

the conditional OR processing component so as to perform conditional OR processing of the current processing line;

thinning out an image of an odd-number line and causing reduction data to be produced by the conditional OR processing component for an even-number line immediately succeeding the odd-number line when a size-change point determined by a reduction rate is the odd-number line; and

causing reduction data produced by the conditional OR processing component for an even-number line and thinning out an image of an odd-number line immediately succeeding the even-number line when the size-change point determined by the reduction rate is the even-number line.

47. (original) The method of controlling an image processing device for processing a binary image as claimed in claim 46, wherein the step of producing a reduced image using the conditional OR process produces but does not output the reduced image and instead outputs a non-reduced image for the even-number line.

48. (original) The method of controlling an image processing device for processing a binary image as claimed in claim 46, wherein the step of producing a reduced image using the conditional OR process produces and outputs the reduced image for the even-number line.

49. (original) The method of controlling an image processing device for processing a binary image as claimed in claim 46, wherein the step of producing a reduced image using the conditional OR process method produces but does not output a reduced image and instead

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outputs a non-reduced image for the even-number line when the immediately preceding odd-number line is not thinned out.

50. (original) The method of controlling an image processing device for processing a binary image as claimed in claim 46, wherein the step of producing a reduced image using the conditional OR process method produces and outputs a reduced image for the even-number line when the immediately preceding odd-number line is thinned out.

51. (original) A method of controlling an image processing device for processing a binary image, the method comprising the steps of:

reducing a size of an image in a sub-scanning direction using a conditional OR process conducted by a conditional OR processing component;

storing data output from the conditional OR processing component in a reduction result line memory component;

storing binary image data of an immediately preceding line in an immediately preceding line memory component;

inputting binary image data of a current processing line, preceding reduction result data read from the reduction result line memory component, and binary image data of an immediately preceding line read from the immediately preceding line memory component to the conditional OR processing component so as to perform conditional OR processing of the current processing line;

thinning out an image of an even-number line and causing reduction data to be produced by the conditional OR processing component for an odd-number line immediately

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succeeding the even-number line when a size-change point determined by a reduction rate is

the even-number line; and

   causing reduction data produced by the conditional OR processing component for an

odd-number line and thinning out an image of an even-number line immediately succeeding

the odd-number line when the size-change point determined by the reduction rate is the odd-

number line.

   52. (original) The method of controlling an image processing device for processing a

binary image as claimed in claim 51, wherein the method produces but does not output a

reduced image for the odd-number line.

   53. (original) The method of controlling an image processing device for processing a

binary image as claimed in claim 51, wherein the method produces and outputs a reduced

image for the odd-number line.

   54. (original) The method of controlling an image processing device for processing a

binary image as claimed in claim 51, wherein the method produces but does not output a

reduced image and instead outputs a non-reduced image for the odd-number line when the

immediately preceding even-number line is not thinned out.

   55. (original) The method of controlling an image processing device for processing a

binary image as claimed in claim 51, wherein the method produces and outputs a reduced

image for the odd-number when the immediately preceding even-number line is thinned out.

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56. (original) The method of controlling an image processing device for processing a binary image as claimed in claim 44, wherein the size of the binary image in a scanning direction is reduced before the size of the binary image in the sub-scanning direction is reduced.

57. (original) The method of controlling an image processing device for processing a binary image as claimed in claim 44, wherein, when a target reduction rate is 50 percent or below, a binary image of the target reduction rate is produced by reducing the size of the binary image in the sub-scanning direction to twice the target reduction rate using a simple thinning-out method and further reducing the reduced binary image to the target reduction rate using the conditional OR process.